AD-A177 321 AUTOMATIC MICROWAVE SEMICONDUCTOR DEVICE TESTING(U) 1/1
HARRIS CORP SYOSSET NY GOVERNMENT SUPPORT SYSTEMS DIV
E A WHITMAN 04 FEB 87 DAAB07-85-C-K566

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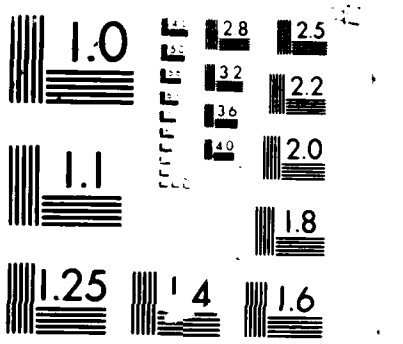
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During the past three months, the project team has focused efforts in the following areas:

- Test Station Work Area
- Computer System Integration
- Network Analyzer System
- Switch Interface/Controller Fabrication
- Major Hardware Status
- AMSDT Front Panel Drawing Update
- Informal Meeting with USACECOM
- Test Strategy Formalization
- "Shared-Hardware" Testing Scenario Considerations
- Program Schedule Revision

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SIXTH QUARTERLY REPORT

(October 16, 1986 - January 15, 1987)

During the past three months, the Automatic Microwave Semiconductor Device Tester (AMSDT) project team has focused efforts in the following areas:

- Test Station Work Area
- Computer System Integration
- Network Analyzer System
- Switch Interface/Controller Fabrication
- Major Hardware Status
- AMSDT Front Panel Drawing Update
- Informal Meeting with USACECOM
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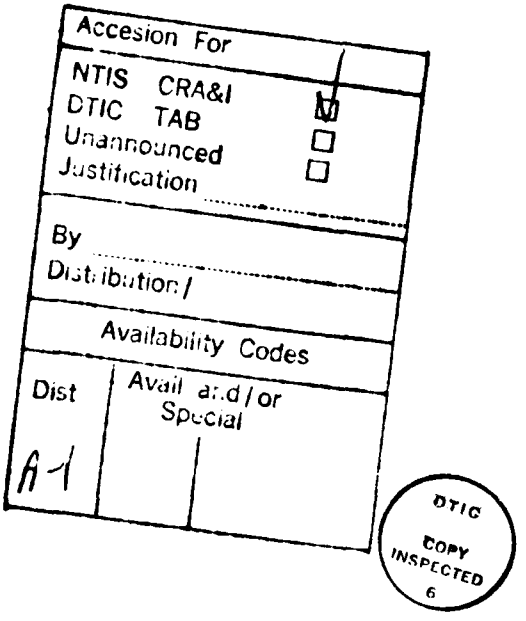

QUARTERLY STATUS REPORT

"AUTOMATIC MICROWAVE SEMICONDUCTOR

DEVICE TESTING"

SIXTH QUARTERLY PROGRESS REPORT

(October 16, 1986 to January 15, 1987)

This project has been accomplished as part of the U.S. Army Manufacturing Methods and Technology (MM&T) Program, which has as its objective the timely establishment of manufacturing processes, techniques or equipment to insure the efficient production of current or future defense programs.

1. TEST STATION WORK AREA

The AMSDT station integration is progressing in the Harris model shop area. During the current reporting period, test station development is proceeding in the following major areas:

A. The 2-1/2 racks have firmly secured to the floor of the model shop in order to ensure stability of the loaded racks.

B. The wiring for the AC power monitor drawer is being completed. This panel will be located at the top of rack number 1. All rack switch/circuit breakers are located in this drawer. This unit will be installed into the rack during the week of January 27, 1987.

C. The internal wiring of the racks will be completed by the end of January. Duplex 115V 60Hz utility outlets will be installed at the bottom of rack number 3. The Hewlett Packard (HP) customer service technician will be called into Harris in early February to check the AC power input for the HP8510A Network Analyzer System, prior to an initial on-site system calibration.

D. Purchase orders have been received by Jonathan Manufacturing Company of Fullerton, Ca. for all the instrument rack mounting slides; in addition, purchase orders have been sent to HP for numerous rack mounting flange kits. The slides are expected to be delivered to Harris during the week of January 26, while the flange kits should be in-house about one week later. Since fabrication of all detailed parts have been completed, it is expected that the AMSDT instrumentation will be mounted to the slides and installed in the racks by early February.

2. COMPUTER SYSTEM INTEGRATION

Work continues on the development of software simulations and the expansion of menu-driven test routines. In particular, the following files have been completed.

- "MENU-DRIVER"
- "MASTER" PROGRAM AND "AUTO-START" PROGRAM
- "TEST-PGM-EXEC"
- "CATEGORY-PROCESSOR"
- "DATA-BASE MANAGER" PROGRAM

The "DATA-BASE MANAGER" program is being debugged along with bar code design and printing. Work has started on the coding and testing of a data base file and loading this information into a "DPSM" file. Completed files are being supplemented by program design documents detailing the modules.

In a separate effort, an overall AMSDT Systems diagram has been completed. The software portion has been reviewed by HP for completeness; especially in the area of the added Shared Resources Management system to the AMSDT system, where new hardware is required.

3. NETWORK ANALYZER SYSTEM

Familiarization with the HP8510A Network Analyzer system via the user manuals continues. Two members of the project team attended a 3-day user hardware training course on the HP8510A system, conducted by Hewlett Packard, in early December. This lab intensive training course enables the project team to employ the full potential of the HP8510A system, maximize its productive operation time and prolong its useful life in the AMSDT program.

Several areas of concern with regards to the HP8510A Network Analyzer system in context with the AMSDT project were revealed during this training course. The matters which require special attention are as follows:

A. System Turn-On

A specified system turn-on sequence for the source (HP8341B), the Network Analyzer System (HP8510A/HP8514A) and peripherals was recommended by HP during the power-up condition. This sequence must be incorporated into the AMSDT's test executive.

B. AC Input Power

The Network Analyzer System and especially the source should not be removed completely from AC power. An oscillator oven in the source is is always kept on during the stand-by mode. If the oven must initially warm up each time AC power is applied, a considerable amount of time may be required for this oscillator (and indirectly the Network Analyzer System) to reach its specified operating accuracy. A special cover will be placed over the circuit breaker for the rack that is to control power to these instruments, to prevent daily AC power shutdown except for long periods of station inactivity.

C. Reference Path Extension Links

Since the intended use of the HP8510A/HP8514A system is to interface all device-under-test (DUT) measurements via the AMSDT System Interface, the two rear reference path extension links (semi-rigid cables), supplied with the system, may have to be modified to achieve the proper electrical balancing during calibration due to the added phase delays through the System Interface.

D. Measurement Errors Due to System Interface

Hewlett Packard stated that their on-site calibration of the Network Analyzer System does not include correction for any errors encountered in the AMSDT System Interface. The HP system engineer indicated that the major source of error through the AMSDT interface would be anomalies to amplitude and phase repeatability through the input switches. The project team is checking with the switch manufacturer's (Teledyne and HP) for this data.

HP8510 System Bus

In its normal usage an external IEEE controller communicates to a special HP8510 bus. This bus controls the Network Analyzer System, the source, and peripherals (plotter and/or printer). Since the AMSDT must utilize the source as an independent stimulus for testing, which does not include the HP8510 system, the HP system engineer stated that Harris must modify the addressing, bus structure and sequencing of commands for these instruments during program execution. The AMSDT project is looking into HP's recommendations.

On 7 January 1987, a meeting was held at Harris between personnel from the HP Electronic Instruments Group and GSSD to discuss these concerns and review the current systems development on the AMSDT program. The agenda of this meeting was to include, but not be limited to, the following items:

- Review of the updated GSSD AMSDT Systems Diagram
- Addressing of the HP8341B Synthesized Sweeper, independent of the HP8510A Network Analyzer
- Mechanically reconfiguring the HP8510A Network Analyzer Unit
- Application of the new HP85171A Integrated "Touchstone" Software to the AMSDT System
- Upgrades to the HP85041A Transistor Test Fixture

An overall review was made of the GSSD AMSDT Systems Diagram. This sketch, which was updated on 6 January 1987, was now reviewed in terms of its hardware content. HP accepted the Harris approach to the hardware implementation of their instrumentation. The subject of the dedicated HP8510A system bus then became the issue. In its normal usage an external IEEE controller communicates to a special HP8510 bus. This bus controls the Network Analyzer System, the HP8341B Synthesized Sweeper (source), and peripherals (plotter and/or printer). Since the AMSDT must utilize the source as an independent stimulus for testing, which does not include the HP8510 system, the HP Systems Applications personnel stated that the source should still reside on the dedicated HP8510 system bus; however, when the source is to be used as an independent stimulus, a "pass-thru" programming technique will allow the external controller to communicate directly with any instruments on the HP8510 system bus. HP also furnished a programming application note illustrating this feature. GSSD said they would change their systems sketch to reflect this bus structure.

In a recent mechanical review of the AMSDT front panel it was realized that the two 26 inch HP85132B 7mm test port semi-rigid cables (which run from the HP8514A S-Parameter Test Set to the GSSD System Interface directly beneath) must now include a 5-1/4 inch expansion panel between these units so to maintain the minimum 5 inch bend radius specified by the manufacturer. Unfortunately, when the 5-1/4 inch expansion panel is placed in this location, the HP8510A Network Analyzer must be moved up to almost the top of rack 2 of the test set. Since the top part of this network analyzer system, the HP85101A Display/Processor, contains a CRT and numerous softkeys which are to

be used extensively during the station integration, it was realized that its usage would be very difficult and awkward to operate from a seated position at the work surface. After the meeting GSSD decided to specify the required length of shorter rigid cables (Coppersol type) which would accommodate the original mechanical layout and maintain the system requirements. This will be done once the hardware has been mounted into the racks and all dimensions are finalized.

HP has available a new family of software for the network analyzer. This package is compatible with the AMSDT hardware/software and is sold as the HP85171A "Touchstone" software. "Touchstone" is a registered trademark of EEsof Incorporated. It appears that HP is selling the EEsof software under a licensing agreement, but modifying it for HP users. A review of this package shows that it is primarily geared for computer aided design and validation engineering applications. There is very little use of this software which conform with the objectives of the AMSDT program. Accordingly, GSSD does not recommend purchase of this item.

Currently the only DUT test fixture purchased for the AMSDT is the HP85041A Transistor Test Fixture (TTF) kit. This TTF is manufactured by Maury Microwave Corporation for HP. The TTF at GSSD is supplied with two interchangeable transistor package inserts for 70 mil and 100 mil DUTs. Recently Maury has made available 50 mil inserts. GSSD inquired whether these inserts would be available under a HP part number. HP informed GSSD that although they do not have this available now, they may be offering supplementary inserts to users if a market exists. GSSD was advised to purchase the item from Maury should it be needed now. HP also recommended that GSSD contact their HP Components Group to see if other test fixtures are available; such as, a Deloach holder, or a fixture to test IMPATT diodes.

Other Miscellaneous Items:

1. HP was to remind their Computer Products Group to issue an updated quote for the hardware/software items needed in the Shared Resources Management upgrade to the AMSDT program.

2. The status of outstanding hardware is that the HP8970A Noise Figure Meter and all the HP71000 Spectrum Analyzer modules are to be shipped from HP, California on January 23. The HP70001A Mainframe will be shipped on January 30.

3. Depending upon the GSSD testing needs, an outboard microwave amplifier may be required to increase the signal level out of the HP8341B source. GSSD will look into this requirement.

4. GSSD was reminded that when the racks are wired up for AC, HP should be contacted to check this installation, prior to their on-site calibration of the HP8510A Network Analyzer System at GSSD.

4. SWITCH INTERFACE/CONTROLLER FABRICATION

Fabrication on the AMSDT Input/Output (I/O) switch in the Harris model shop is complete, except for the installation of the HP346B Noise Source (ordered with the HP8970A Noise Figure Meter) and mounting of the rack slides. Engineering work is concentrating on the emulation and debugging of the firmware for the switch controller. In order to reduce delays in the firmware development, GSSD will be renting an 8051 microprocessor emulator system and logic analyzer board for the duration of the switch firmware development.

5. MAJOR HARDWARE STATUS

During the current reporting period the following hardware has been received and placed in the station integration area:

- HP8112A Pulse Generator
- HP54201A Programmable Scope
- HP8717B Bias Power Supply
- HP98568A Bus Expander

As reported earlier, the HP hardware will all be shipped at the end of January. National Instruments informed Harris that they are now able to ship the fiber optic/coaxial extenders. Delivery is expected during the week of January 26.

6. AMSDT FRONT PANEL DRAWING UPDATE

The front panel layout drawing of the AMSDT 2-1/2 rack station has been updated to reflect the addition of AC utility outlets, corrected equipment sizes, and adjusted expansion panel heights. This drawing will be finalized in early February when all equipment has been located in the racks.

7. INFORMAL MEETING WITH USACECOM

An informal meeting was held on 30 October 1986 at Harris GSSD, between personnel from USACECOM and GSSD, to review the current status of the AMSDT program. The meeting dealt with the following:

A. Old Action Items

(1) Harris will investigate the Army's concept of a "shared-hardware" testing scenario, both from multiple site configurations and also a "dual-port" interface, and prepare a proposal detailing the recommended approach. Expected completion date is in late December 1986.

(2) USACECOM indicated that the device-under-test measurement scenario (shown in the September PDR document), of the semiconductor types to be tested with the AMSDT, along with tables of measured parameters, was satisfactory.

B. New Action Items

(1) USACECOM will expedite modifications to the CAO and the original contract ETC to reflect a 21-week extension (to approximately 5 January 1988). This extension is due to the additional work efforts on the program.

(2) GSSD will revise and update the existing program schedule to address tangible events and reflect the newly approved additional work efforts.

During the meeting USACECOM viewed the hardware development of the AMSDT. GSSD stated that all the CTE is expected to be installed in the system racks by the end of December, and that integration could be started in the beginning of 1987.

8. TEST STRATEGY FORMALIZATION

Test strategy techniques to accomplish device testing are being reviewed for each specific microwave semiconductor DUT. These tables include the following categories for each selected DUT:

(a) Mneumonic Used for Device
(b) Tested Parameters
(c) Fixturization Needed
(d) Required Instrumentation
(e) Detailed Test Methodology

Critique of these tables are of prime importance since they determine the testing capability of the AMSDT system.

9. "SHARED-HARDWARE" TESTING SCENARIO CONSIDERATIONS

As a result of the recent USACECOM/Harris meeting, the project team was asked to investigate the Army's concept of a "shared-hardware" testing scenario, both from remote multiple site configurations and also a "dual-port" interface, and prepare a paper detailing the recommended approach. This investigation has been completed with the results to be forwarded to the Harris Business Development department in late January 1987 for transmittal to USACECOM.

10. PROGRAM SCHEDULE REVISION

During the recent USACECOM/Harris meeting, Harris stated that the existing program schedule would be revised and updated to address tangible events and reflect the recently awarded Shared Resource Management and Touch Screen enhancements. The schedule has been completed and is currently being formalized by the PMO Department at Harris for transmittal to USACECOM.

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